



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D T _C = +25°C (Note 7)
60V	3.1mΩ @ V _{GS} = 10V	100A

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application
- Low R_{DS(ON)} – Minimizes Power Losses
- Low Q_g – Minimizes Switching Losses

Description and Applications

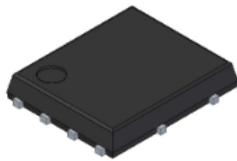
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- DC motor controls
- Synchronous rectifications
- DC-DC converters

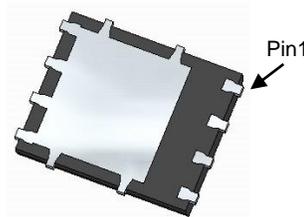
Mechanical Data

- Package: PowerDI®5060-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Weight: 0.097 grams (Approximate)

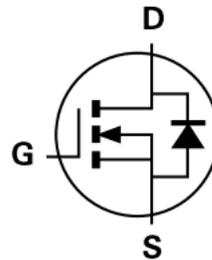
PowerDI5060-8



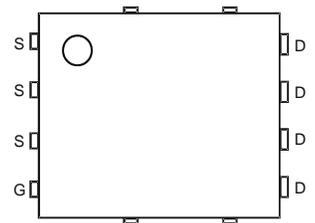
Top View



Bottom View



Internal Schematic



Top View
Pin Configuration

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	60	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 5)	Steady State	T _A = +25°C	I _D	25	A
		T _A = +70°C		21	
Continuous Drain Current (Notes 6 & 7)		T _C = +25°C	I _D	100	A
		T _C = +100°C		100	
Maximum Continuous Body Diode Forward Current (Notes 6 & 7)			I _S	100	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	400	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)			I _{SM}	400	A
Avalanche Current, L=0.2mH			I _{AS}	45	A
Avalanche Energy, L=0.2mH			E _{AS}	200	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	3.2	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	47	°C/W
Total Power Dissipation (Note 6)	T _C = +25°C	P _D	167	W
Thermal Resistance, Junction to Case (Note 6)		R _{θJC}	0.9	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +175	°C

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 6. Thermal resistance from junction to soldering point (on the exposed drain pad).
 7. Package limited.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	V _{GS} = 0V, I _D = 1mA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 48V, V _{GS} = 0V
		—	—	100	μA	V _{DS} = 48V, V _{GS} = 0V, T _J = +125°C
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	2	—	4	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	2.5	3.1	mΩ	V _{GS} = 10V, I _D = 50A
Diode Forward Voltage	V _{SD}	—	0.9	1.2	V	V _{GS} = 0V, I _S = 20A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	4556	—	pF	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	1383	—		
Reverse Transfer Capacitance	C _{rss}	—	105.2	—		
Gate Resistance	R _g	0.1	0.66	1.9	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	—	95.4	—	nC	V _{DD} = 30V, I _D = 90A, V _{GS} = 10V
Gate-Source Charge	Q _{gs}	—	21.6	—		
Gate-Drain Charge	Q _{gd}	—	20.4	—		
Turn-On Delay Time	t _{D(ON)}	—	13.2	—	ns	V _{DD} = 30V, V _{GS} = 10V, I _D = 90A, R _G = 3.5Ω
Turn-On Rise Time	t _R	—	11.7	—		
Turn-Off Delay Time	t _{D(OFF)}	—	31	—		
Turn-Off Fall Time	t _F	—	12	—		
Body Diode Reverse Recovery Time	t _{RR}	—	50.5	—	ns	I _F = 50A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	80.8	—	nC	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

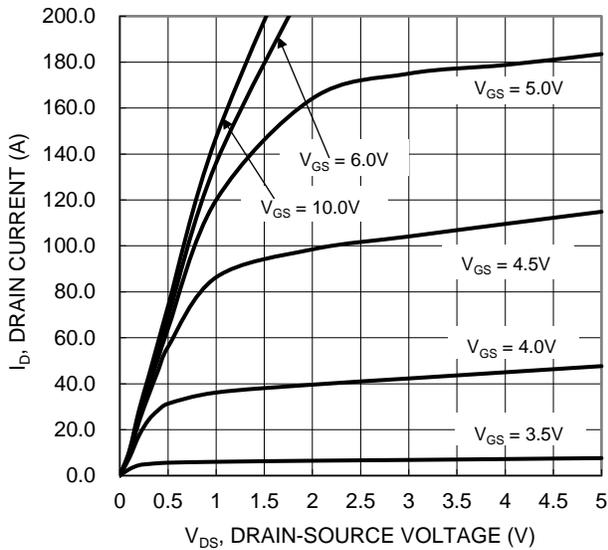


Figure 1 Typical Output Characteristic

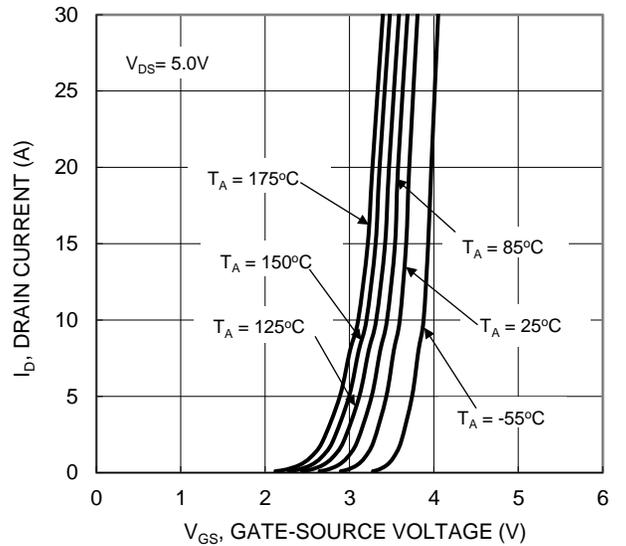


Figure 2 Typical Transfer Characteristic

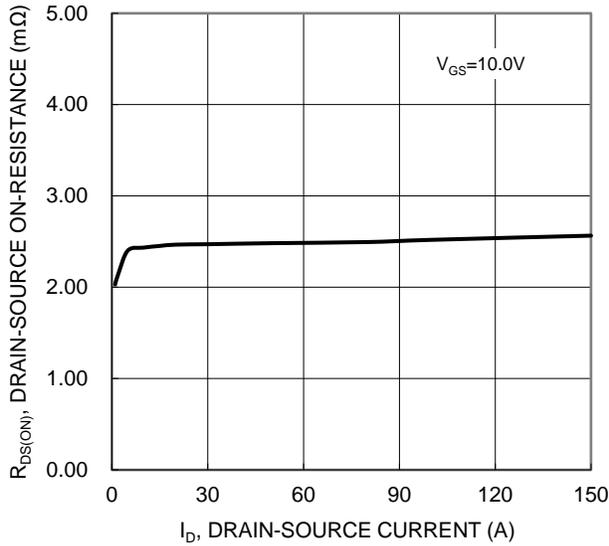


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

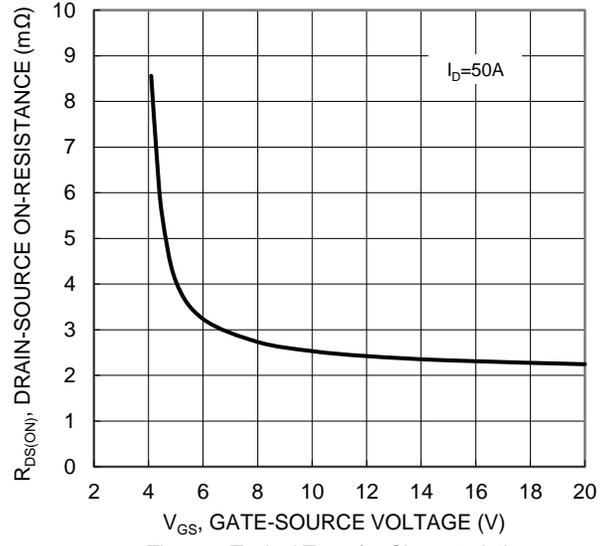


Figure 4 Typical Transfer Characteristic

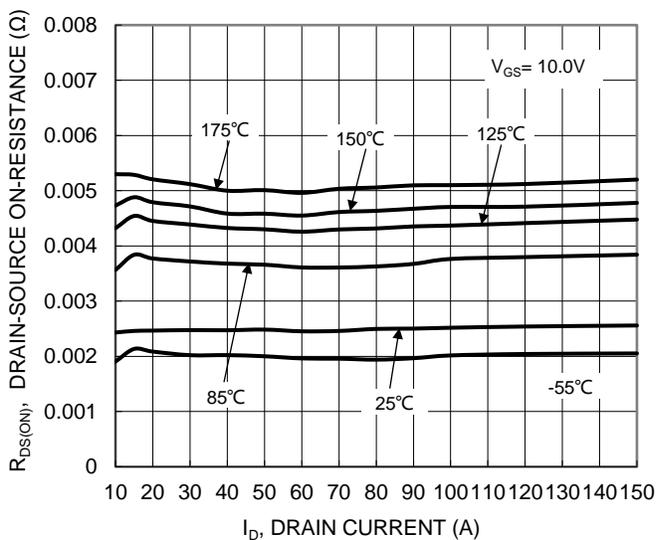


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

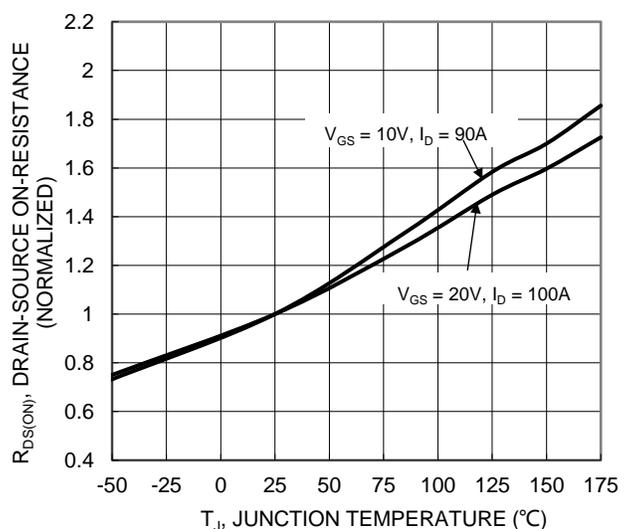


Figure 6 On-Resistance Variation with Temperature

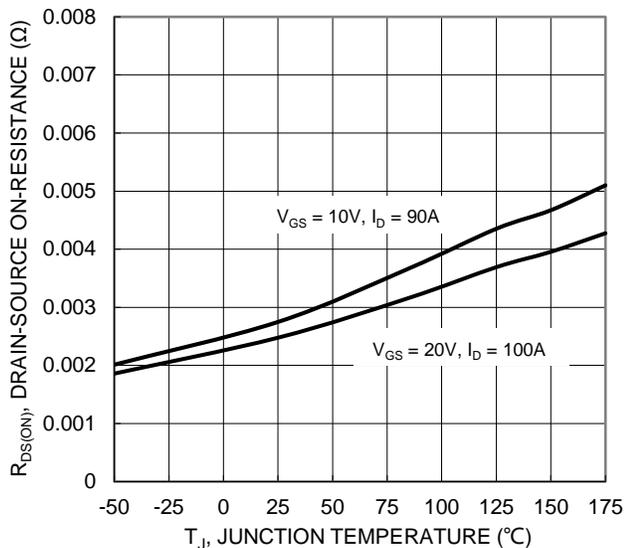


Figure 7 On-Resistance Variation with Temperature

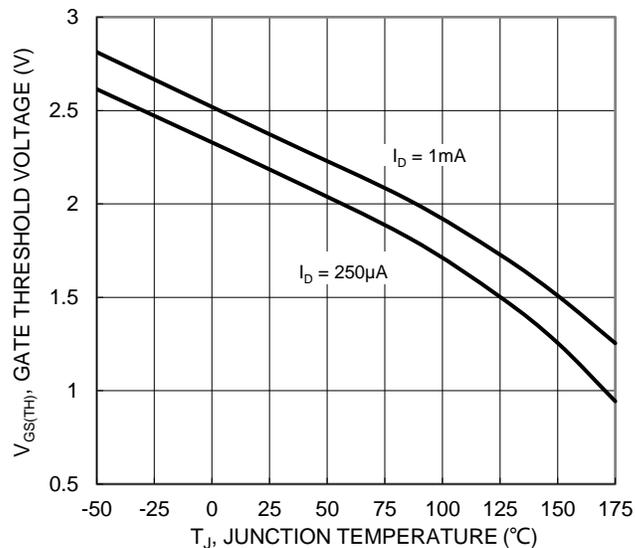


Figure 8 Gate Threshold Variation vs. Temperature

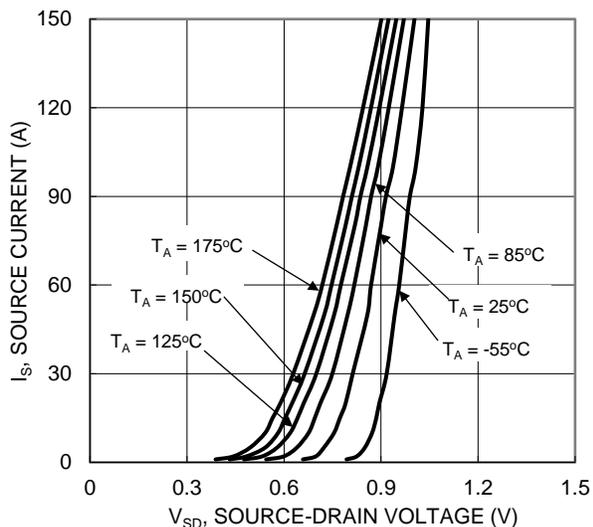


Figure 9 Diode Forward Voltage vs. Current

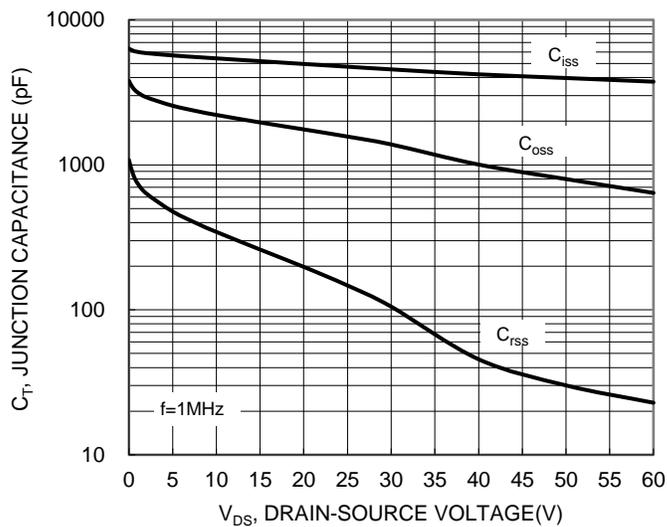


Figure 10 Typical Junction Capacitance

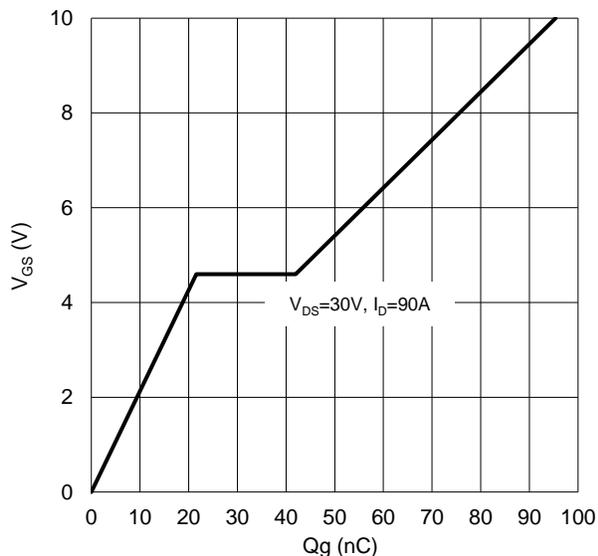


Figure 11 Gate Charge

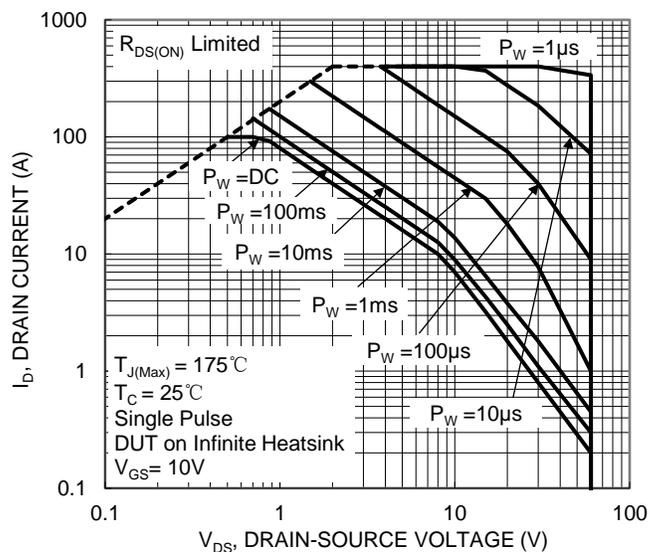


Figure 12. SOA, Safe Operation Area

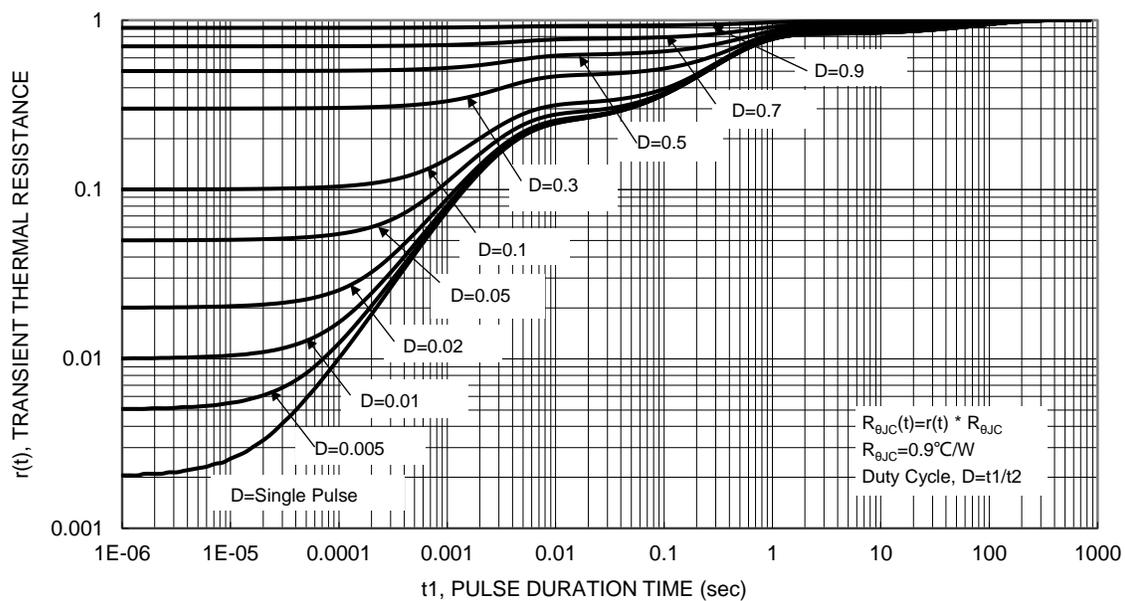
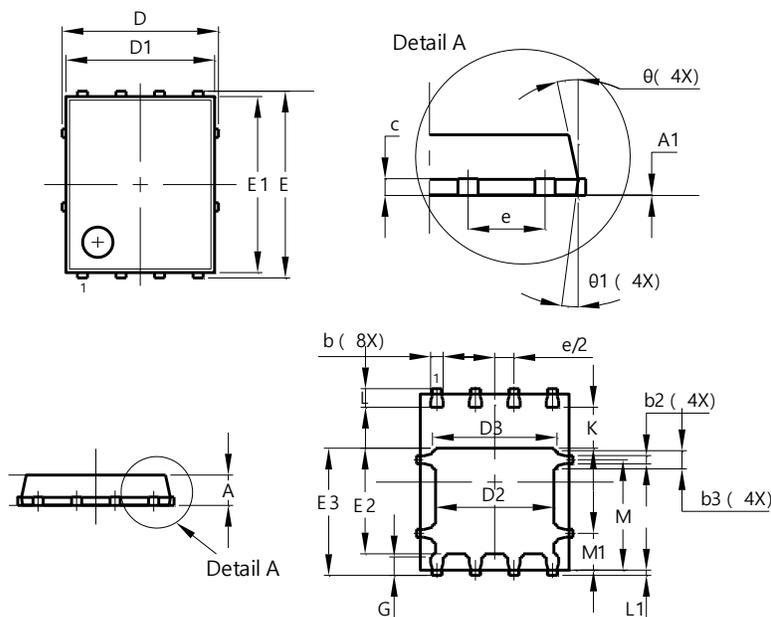


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

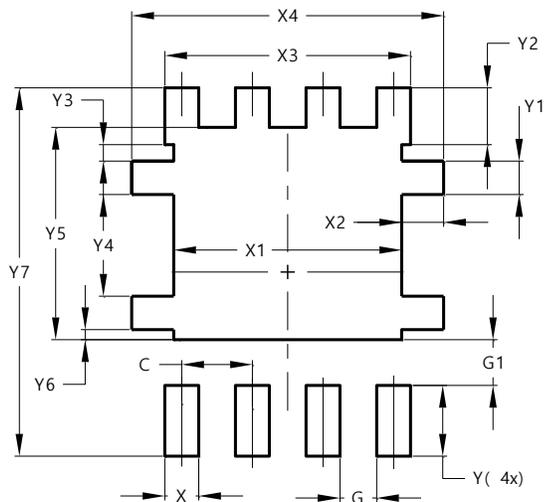
PowerDI5060-8



PowerDI5060-8			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	-
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
K	0.51	-	-
L	0.51	0.71	0.61
L1	0.100	0.200	0.175
M	3.235	4.035	3.635
M1	1.00	1.40	1.21
θ	10°	12°	11°
θ_1	6°	8°	7°
All Dimensions in mm			

Suggested Pad Layout

PowerDI5060-8



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	0.755
X3	4.420
X4	5.610
Y	1.270
Y1	0.600
Y2	1.020
Y3	0.295
Y4	1.825
Y5	3.810
Y6	0.180
Y7	6.610